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Asia Water Forum 2022

8–11 August 2022 • Online

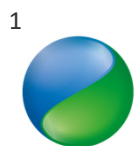
Focus Area: Climate change and water-related risks

Session Title: Understanding, managing and communicating risks

Schedule: 9 August 2022 | 3:00pm - 4:30pm

Understanding the links between drought indices and drought impacts to improve drought resilience in Thailand

Michael Eastman¹, Supattra Visseri², Chaiwat Ekkawatpanit³, Liwa Pardthaisong⁴, Simon Parry¹, Lucy Barker¹, Jamie Hannaford¹, Maliko Tanguy¹, Eugene Magee¹, Ian Holman⁵, Lola Rey⁵, Daniel Goodwin⁵



UK Centre for Ecology & Hydrology



STAR

Strengthening Thailand's Agricultural drought Resilience

การพัฒนาศักยภาพ ของประเทศไทย ต่อการรับมือ ปรับตัว และฟื้นคืนกลับ จากภัยแล้งด้านการเกษตร

www.ceh.ac.uk/our-science/projects/star

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Drought in Thailand



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Thailand's
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Occur in all climatic zones



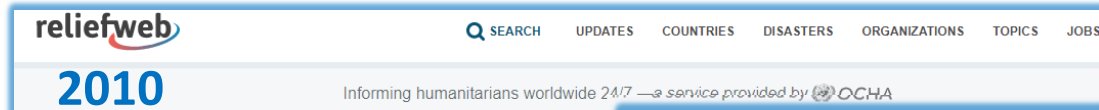
Are complex, compound events
(Van Loon et al., 2015)



Projected to increase in frequency and severity due to climate change



Are one of the most costly natural hazards



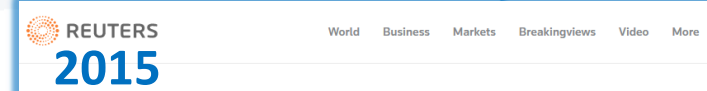
Thailand

Drought harms Thai agricultural sector

News and Press Release • Source: [Govt. Thailand](#) • Posted: 1 Jul 2010

BANGKOK, 1 July 2010 (NNT) - The drought crisis in 44 provinces across Thailand has dragged down the Thai economy, with the government's fiscal deficit expected to reach nearly 14 billion THB.

Agriculture and Cooperatives Minister Pongthorn Thammachart said the sector is expected to suffer from a 10% drop in output, with growers of off-season crops facing the hardest hit.



Thai crops to suffer worst drought in 15 years

ENVIRONMENT FEBRUARY 5, 2015 / 10:58 AM / UPDATED 7 YEARS AGO

By Reuters Staff

2 MIN READ



Thailand Faces Record Drought

March 29, 2020 1:04 PM
VOA News



FILE - A family prays near the ruins of a headless Buddha statue, which has resurfaced in a dried-up dam due to drought, in Lopburi, Thailand, Aug. 1, 2019.



Strengthening Thailand's Agricultural drought Resilience (STAR)

- Monitoring and early warning is crucial to integrated drought management and building resilience
 - STAR aims to improve the resilience to agricultural droughts in Thailand by understanding the links between drought impacts and drought indicators
- This presentation will look at the links meteorological drought indices and drought impact data





Analysis of drought indicators vs. impacts

Standardised meteorological drought indicators often used in operational drought monitoring and early warning systems

→ But how do they relate to actual impacts on the ground?

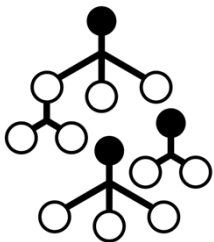
SPI = Standardised
Precipitation Index

SPEI = Standardised
Precipitation-
Evaporation Index



CORRELATION ANALYSIS

- Using remote sensing vegetation indicators (VIs) as “proxy” for drought impacts
- Meteorological indicators (SPI, SPEI) vs. VIs per province – for wet and dry season



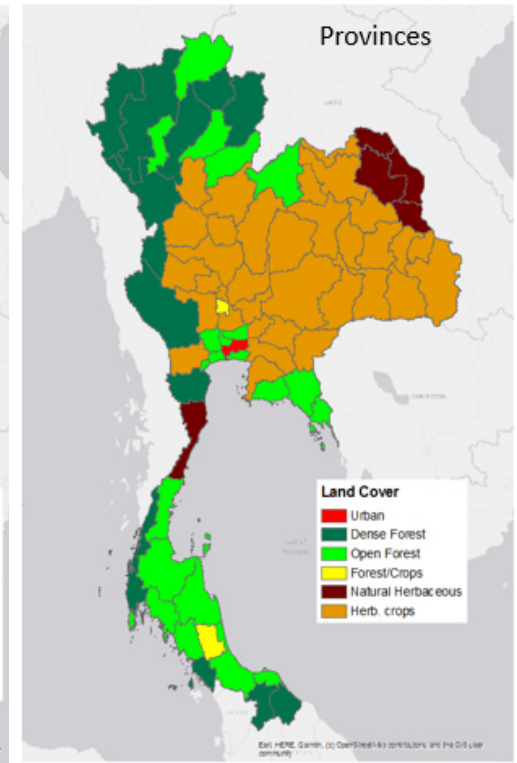
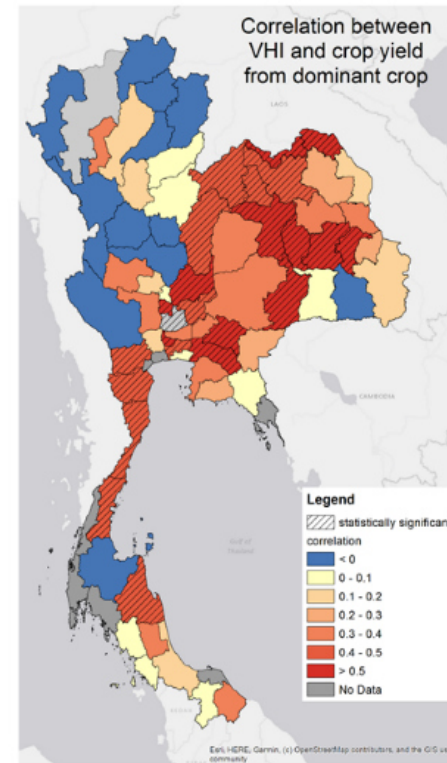
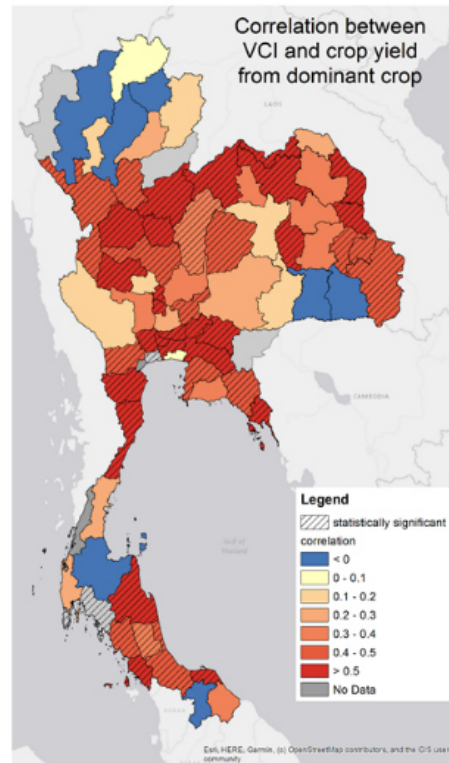
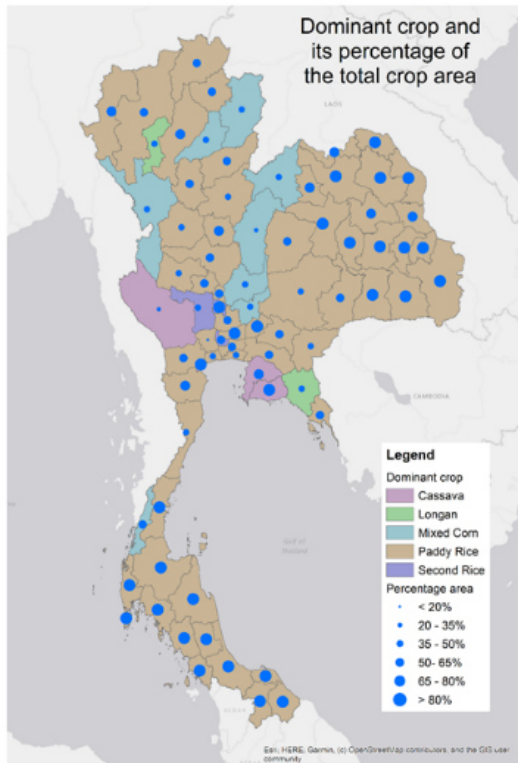
RANDOM FOREST MODELS

- One model per crop and per region
- Analysis of feature importance





Correlation Analysis: VIs vs. Crop Yield





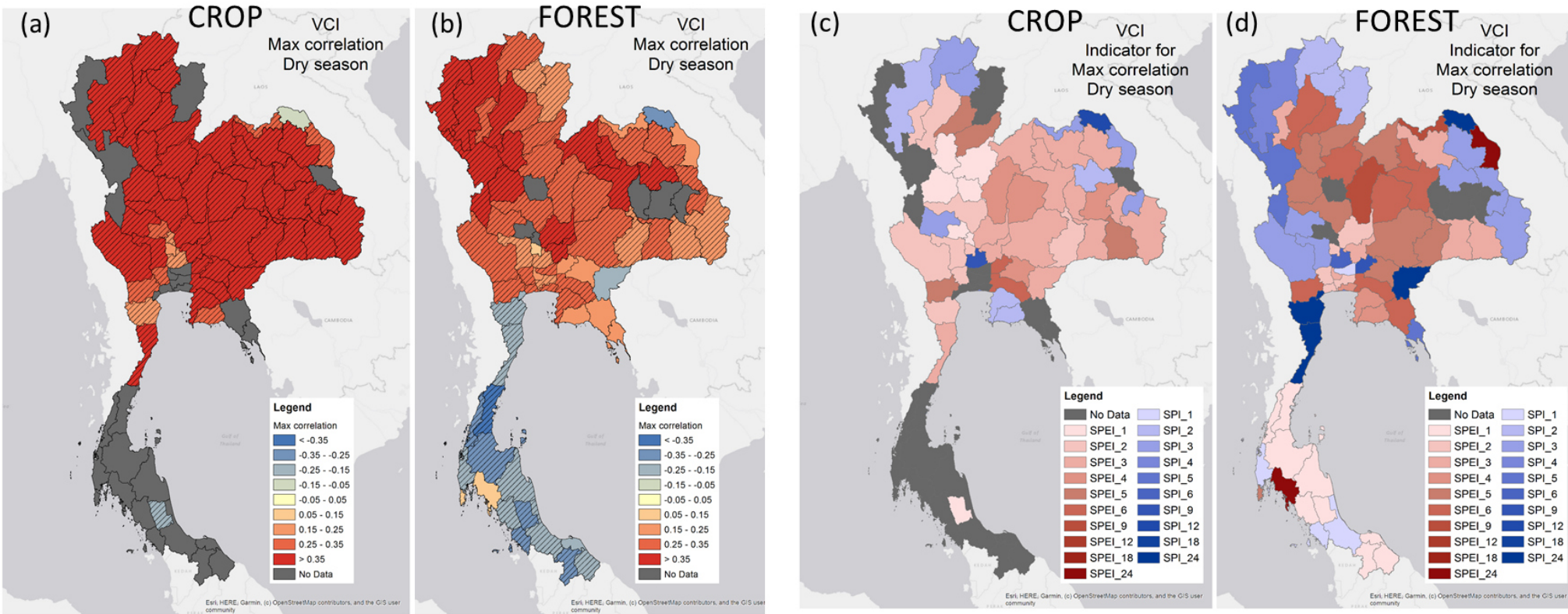
Met. indicator vs. VIs: DRY SEASON



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VI = Vegetation Indices VCI = Vegetation Condition Index VHI = Vegetation Health Index
SPI = Standardised Precipitation Index SPEI = Standardised Precipitation-Evaporation Index





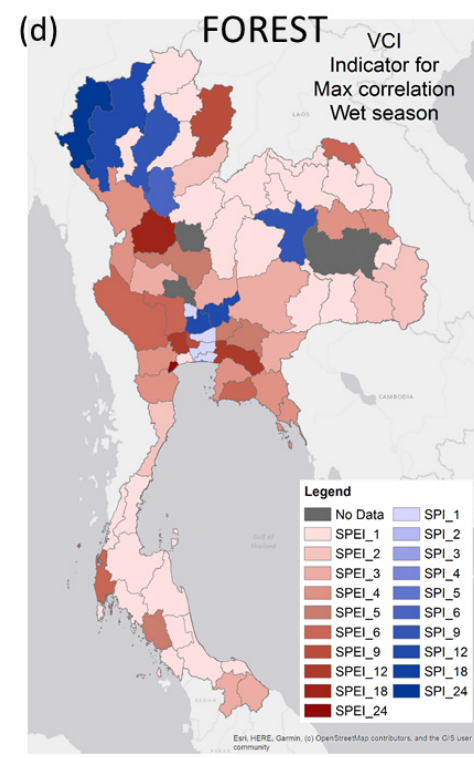
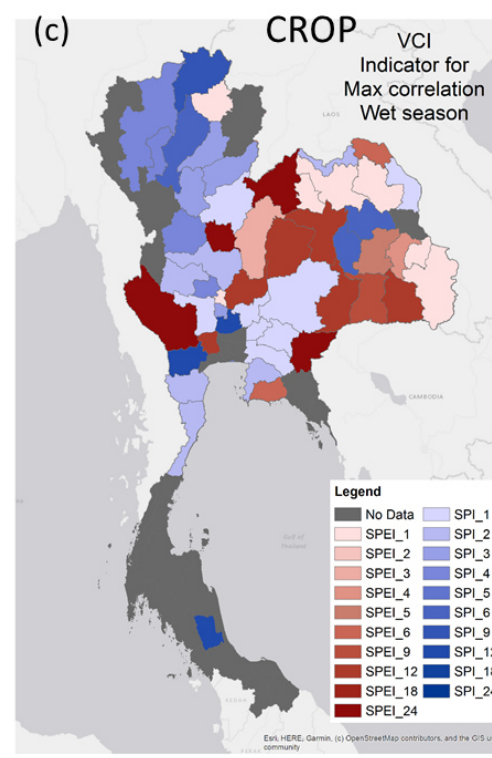
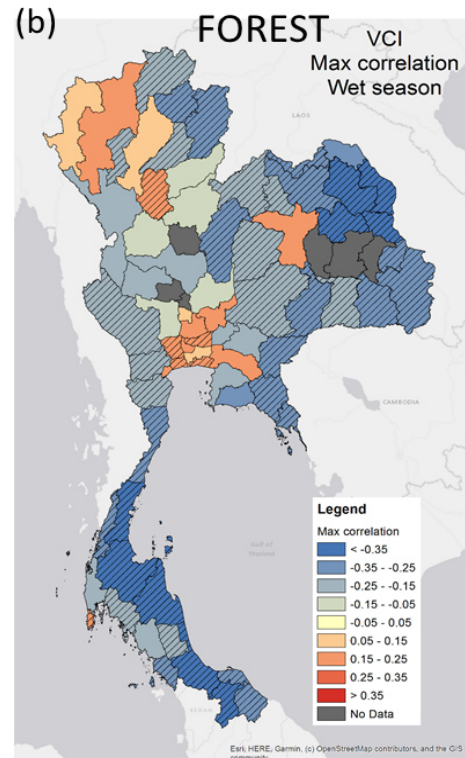
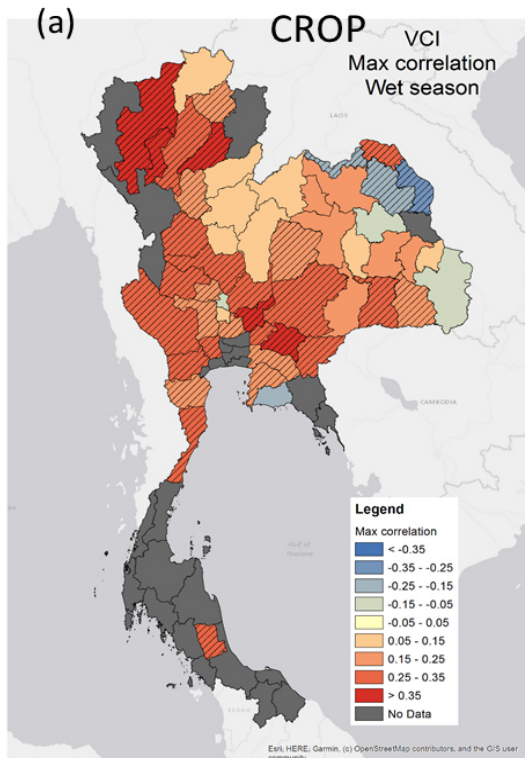
Met. indicator vs. VIs: WET SEASON



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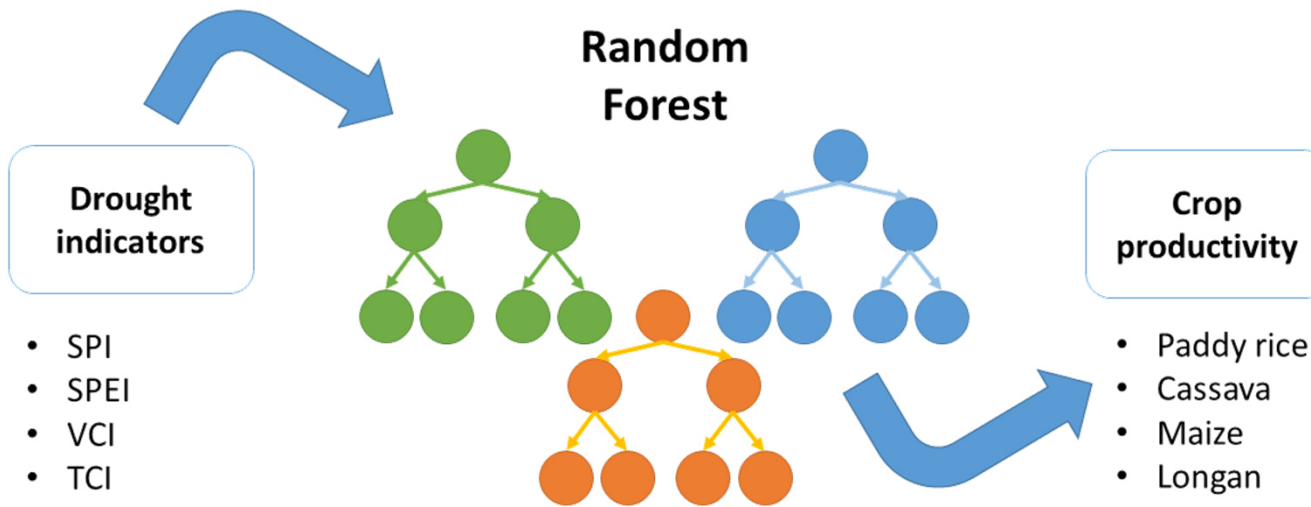


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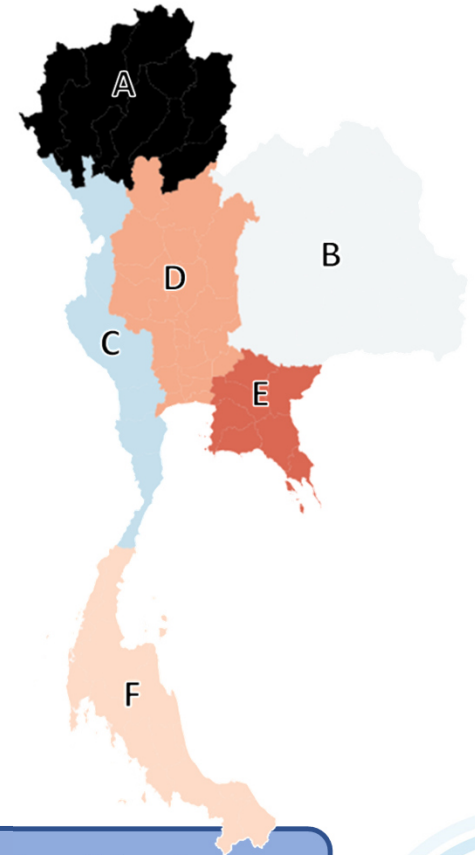


Random Forest Models



1-12, 24 month
 All starting months

kg/rai





Random Forest: Results

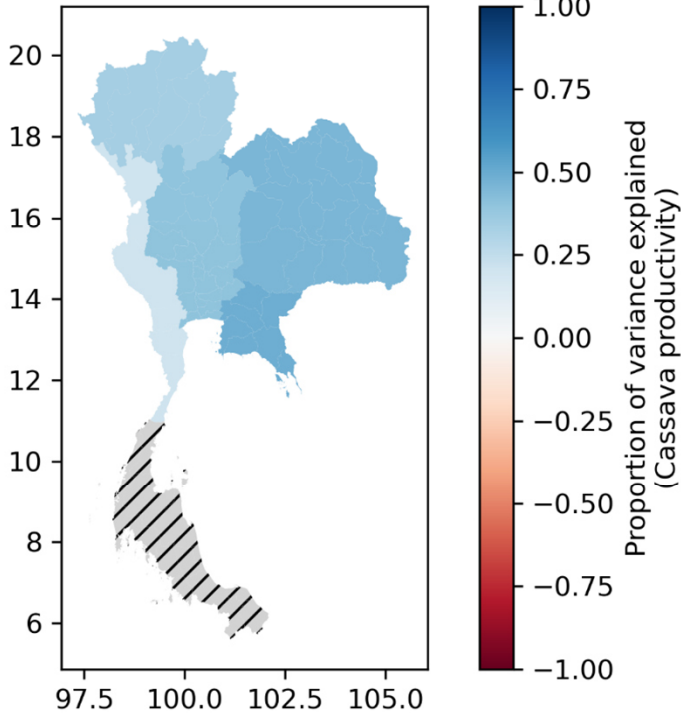


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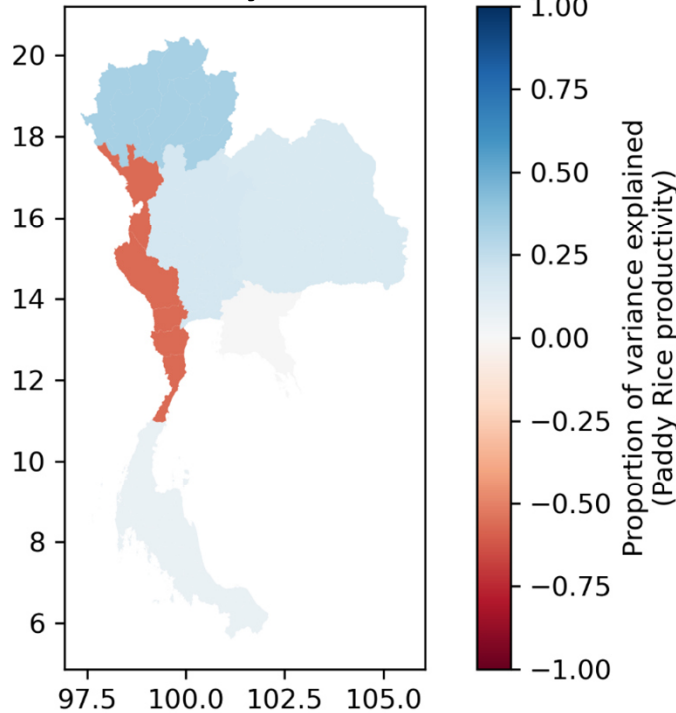
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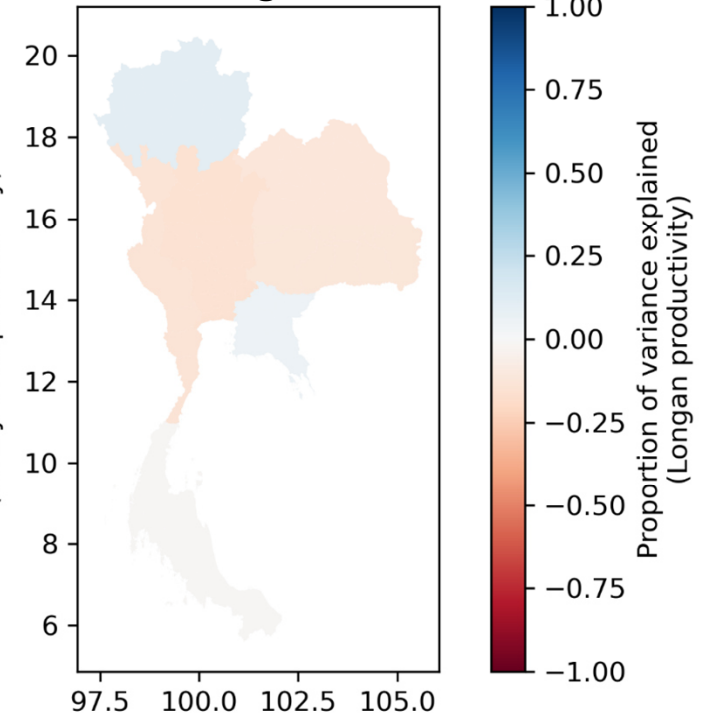
Cassava



Paddy Rice



Longan





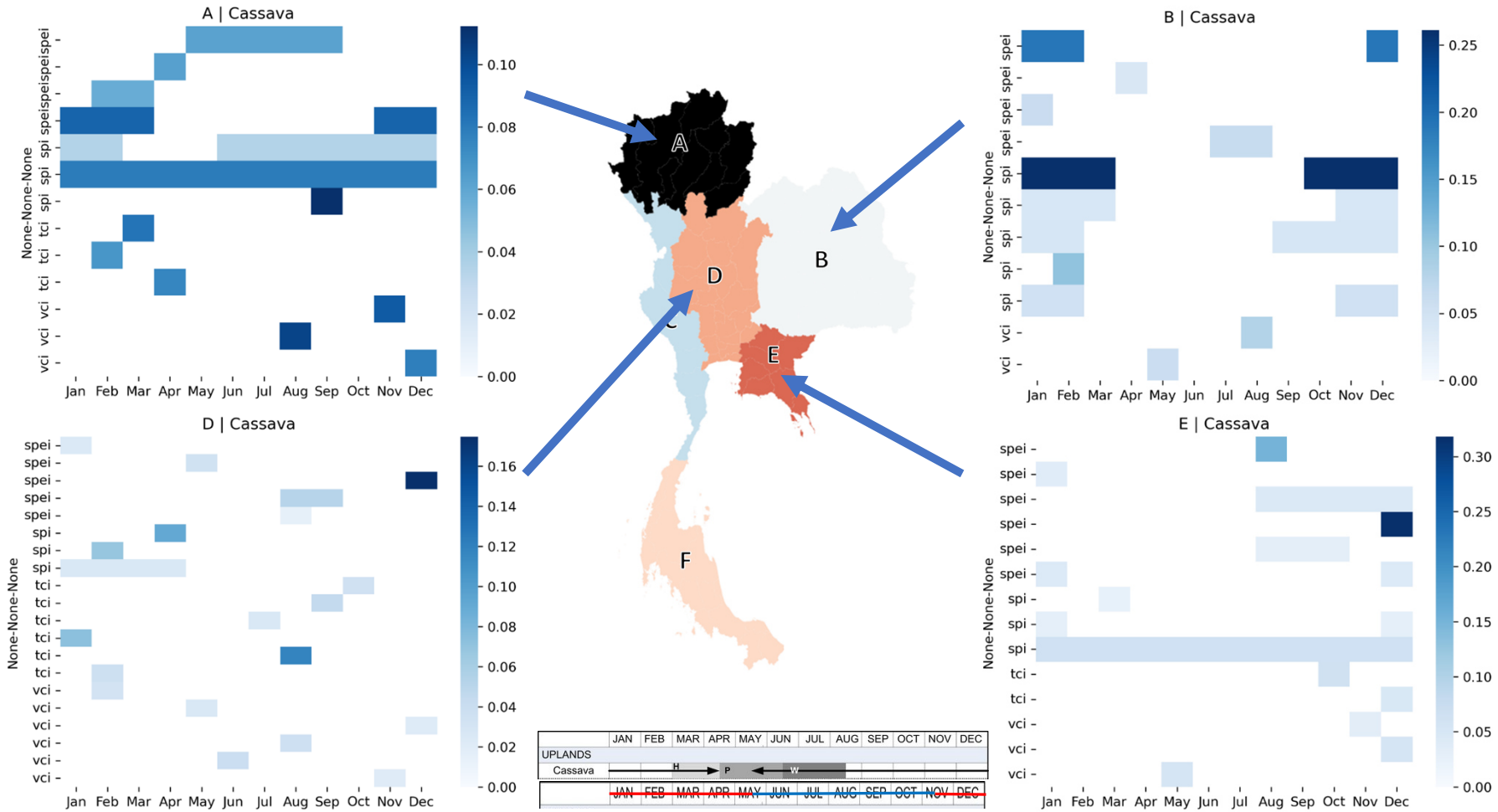
Feature importance: example of Cassava



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Conclusions & Next Steps

Conclusions:

- Spatio-temporal differences in relationships between drought indicators and impacts
- Meteorological indicators are a useful tool for drought monitoring once these relationships are better understood

Next steps:

- Produce summaries of findings and recommendations for stakeholders
- Carry out similar analysis in other SE Asia countries (e.g. Malaysia)
- Define drought indicator thresholds below which the likelihood of impacts is increased

